PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 :
B01D 29/94, 29/60

A1

(11) International Publication Number: WO 91/09661

(43) International Publication Date: 11 July 1991 (11.07.91)

(21) International Application Number: PCT/NL90/00184

(22) International Filing Date: 21 December 1990 (21.12.90)

(30) Priority data:
8903177 29 December 1989 (29.12.89) NL

(71) Applicant *(for all designated States except US)*: AMAFILTER BV [NL/NL]; Kwakelkade 28, NL-1800 AJ Alkmaar (NL).

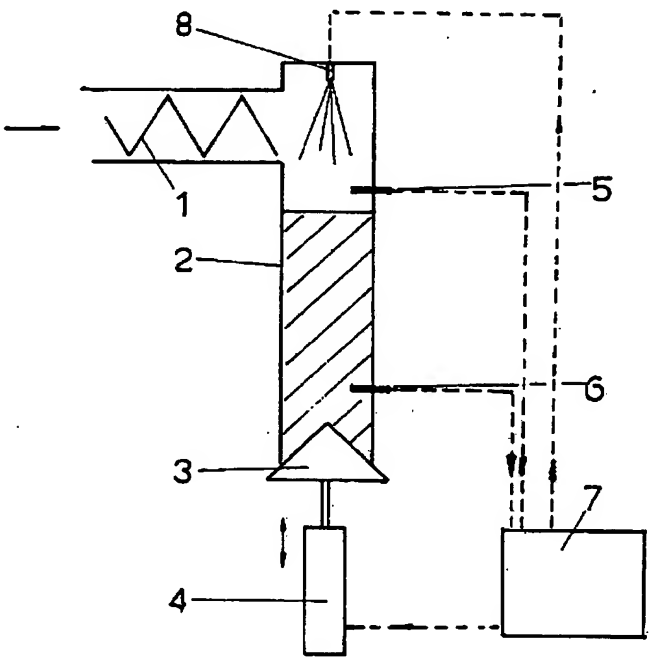
(72) Inventor; and
(75) Inventor/Applicant *(for US only)* : DOSOUDIL, Martin [NL/NL]; Kwakelkade 28, NL-1800 AJ Alkmaar (NL).

(74) Agent: KOOMEN, J.; Kennemerstraatweg 35, NL-1814 GB Alkmaar (NL).

(81) Designated States: AT (European patent), AU, BE (European patent), CH (European patent), DE (European patent), DK (European patent), ES (European patent), FR (European patent), GB (European patent), GR (European patent), IT (European patent), JP, KP, KR, LU (European patent), NL (European patent), SE (European patent), SU, US.

Published
With international search report.
In English translation (filed in Dutch).

(54) Title: METHOD AND DEVICE FOR CARRYING OFF THE FILTER CAKE FROM A FILTER APPARATUS



(57) Abstract

Method and apparatus for the discharge of the filter cake out of a filter apparatus, whereby the filter cake is conveyed towards a discharge shaft to fall down into it, and whereby, when the cake reaches a certain height within the shaft, it is opened at or near its bottom end and the filter cake is pressed or blown out of the shaft by the over-pressure on the upper side of the cake.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	ES	Spain	MG	Madagascar
AU	Australia	FI	Finland	ML	Mali
BB	Barbados	FR	France	MN	Mongolia
BE	Belgium	GA	Gabon	MR	Mauritania
BF	Burkina Faso	GB	United Kingdom	MW	Malawi
BG	Bulgaria	GN	Guinea	NL	Netherlands
BJ	Benin	GR	Greece	NO	Norway
BR	Brazil	HU	Hungary	PL	Poland
CA	Canada	IT	Italy	RO	Romania
CF	Central African Republic	JP	Japan	SD	Sudan
CG	Congo	KP	Democratic People's Republic of Korea	SE	Sweden
CH	Switzerland			SN	Senegal
CI	Côte d'Ivoire	KR	Republic of Korea	SU	Soviet Union
CM	Cameroon	LI	Liechtenstein	TD	Chad
CS	Czechoslovakia	LK	Sri Lanka	TG	Togo
DE	Germany	LU	Luxembourg	US	United States of America
DK	Denmark	MC	Monaco		

Method and device for carrying off the filter cake from a filter apparatus

The invention relates to a method and device for the discharge of the filter cake, loosened from the filter elements, out of the filter vessel of a filter apparatus, more in particular out of a high pressure continuous filter device.

Such a method and device is known, in which the loosened filter cake is discharged from out the over-pressured filter vessel by means of two conveyor screws, adjoining each other under an angle of 90 degrees, and in which the second conveyor screw which debouches out of the filter vessel, along with the more or less compressed filter cake has to form a closure between the inner-side and the outer-side of the filter vessel being under pressure, so that only the filter cake will be transported outside by the second conveyor screw and no pressure-loss will occur in the filter vessel itself.

This known method has the drawback that with certain types of cake compositions the cake in the second conveyor screw no longer is transported outside, but starts to turn along with the conveyor screw.
Also in this known method and device, with certain types of cake composition an inadmissibly high wearing of the

blades of the conveyor screws occurs, causing the necessity to replace them quickly and repeatedly.

The invention aims to obviate the drawbacks of the known method and apparatus for the discharge of the filter cake, loosened from the filter elements out of a filter vessel of a filter apparatus, more in particular out of a high pressure continuous filter apparatus.

The method according to the invention is characterized in that the filter cake is conveyed towards a discharge shaft, to fall down into it, and when the cake reaches a certain height within the shaft, the shaft is opened near or at the bottom end, and the filter cake is pushed or blown out of the shaft by the over-pressure in the filter vessel.

By applying the method according to the invention, the filter cake is continuously conveyed out of the filter vessel towards the discharge shaft, the shaft opens and closes periodically to periodically press or blow away the cake, collected within the shaft, out of the shaft.

The pressing or blowing away of the filter cake out of the shaft may take place completely without any disturbances, and by the expansion of the gas or air, present within the space between the cake elements in the shaft during the pressing or blowing away of the cake from out of the shaft, causing the cake elements to be loosened from each other and from the wall of the shaft in a favourable manner.

The filter cake loosened from the filter elements may be conveyed towards the discharge shaft in various ways.

According to a characteristic of the method according to the invention the filter cake is conveyed towards the

shaft by means of a conveyor screw.

During the pressing or blowing away of the cake from out of the shaft it is inevitable, that along with the cake a part of the air- or gas-content of the filter vessel is discharged along with the filter cake to the outside and causing the occurrence of a certain pressure-loss within the filter vessel.

In order to reduce this pressure-loss to a minimum during the pressing or blowing away of the filter cake from out of the discharge shaft, the method according to the invention is further characterized in that the cake is sealed with a powder-shaped or viscous means, e.g. a viscous oil, before the cake is pressed or blown away out of the shaft.

The sealing means may be put into the shaft in various ways.
Thus, the sealing means may be pressed into the shaft by means of a plunger.

The periodical opening and closing of the discharge of the shaft may take place in various ways.

In a favourable way according to a further characteristic of the method according to the invention, the opening and closing of the discharge of the shaft takes place automatically, and more in particular under the control of one or more sensors, placed within the shaft.

Thus, a high level sensor may be present, which may be activated when the cake in the shaft reached a maximum height, and a low level sensor, which is activated when the cake in the shaft drops down to or below this low level sensor.

In a favourable embodiment of the invented method, when the cake in the shaft reaches a certain maximum height, the discharge is opened for a certain period of time.

This period of time for the opening of the discharge may efficiently be adjustable in dependance uponon the nature of the cake to be removed from out of the shaft.

In a preferred embodiment of the invented method the opening time of the opening cyclus is increased or decreased with a certain time interval depending on either the not-reaching or the exceeding of a certain preferred minimum height of the cake within the shaft. Thus, in this embodiment of the invented method an automatic adaptation to the nature of the cake to be discharged, occurs.

In a favourable way in a further working out of the method according to the invention, the opening of the discharge is controlled by a high level sensor and the increasing or decreasing of the opening time with the time interval is controlled by a low level sensor.

Thus, in this embodiment of the invented method the opening time may fluctuate around a certain average value and in the same way the height of the cake at the low level may fluctuate around a certain average minimum value.

In a further working out of the invented method, in order to prevent the cake from remaining hanging in the shaft, the outlet of the discharge is increased at a following opening cyclus, with, at the high level sensor remaining activated during a certain period of time.

The apparatus for applying the invented method consists of a filter apparatus more in particular a high pressure continuous filter apparatus, with a filter vessel

provided with conveyor means, more in particular a conveyor screw, by which the filter cake, loosened from the filter elements, may be discharged out of the filter vessel, the apparatus being characterized in that the conveyor means connect onto a discharge shaft, which has been provided at or near its bottom end with a closing means, in such a way, that when the filter cake reaches a certain height within the discharge shaft, it is opened, and the cake is pressed or blown out of the shaft by the over-pressure in the filter vessel.

In a favourable embodiment of the apparatus according to the invention the shaft extends widens conically towards the bottom end.
By this measure is achieved that the cake within the shaft is loosened from the shaft wall during the pressing or blowing away from out of the shaft, and the discharge of the cake from out of the shaft facilitated.

In a further embodiment of the invented apparatus, the shaft is provided with one or more sensors, such as electrodes, by which the height of the cake within the shaft may be determined and the closing means of the shaft may be controlled.
The electrodes may be positioned within the shaft at various heights in respect to one another, such, that when two electrodes which are positioned above one another both engage the filter cake, it causes an electrical closure between both the electrodes, and by which, by means of a known controlling device, the closing means of the shaft may be opened temporarily for the discharge of the filter cake outside the filter apparatus.

For sealing the upper side of the cake, according to a last feature of the invented apparatus, the shaft is provided with one or more inlet openings, through which a

sealing means for sealing off the openings in the cake or the openings between between the cake elements, such as a viscous oil, may be applied onto the upper side of the cake before it will be pressed or blown away out of the shaft.

The invention will now be explained with reference to the drawing of an example of an embodiment.

As is shown in Fig. 1, by means of the conveyor screw 1, which extends towards a filter vessel which is not shown in the drawing, the filter cake loosened from the filter elements of the filter vessel is conveyed towards a discharge shaft 2, which at its bottom end is provided with a sluice 3, which is controllable by means of an hydraulic cylinder 4.
Within the shaft two scanning electrodes 5 and 6 are positioned, such that when the filter cake forms an electrical closure between both the electrodes by reaching a certain height within the shaft, the controlling device 7 shortly opens up the sluice 3, causing the filter cake to be pressed or blown away out of the shaft by the over-pressure in the filter vessel.
Before the opening of the sluice a sealing means may be brought onto the filter cake within the shaft, to minimalise the presure-loss within the filter vessel which occurs at the emptying of the shaft.

The injection of the sealing means through the inlet opening 8 may be controlled by a known controlling device 7.

C L A I M S.

1. Method for the discharge of filter cake loosened from the filter elements, from out of a filter vessel of a filter apparatus, more in particular a high pressure continuous filter apparatus, characterized in that the filter cake is conveyed towards a discharge shaft to fall down into it, and with the cake reaching a certain height within the shaft, this is being opened at or near its bottom end and the filter cake is pressed or blown out of the shaft by the over-pressure within the filter vessel.

2. Method according to claim 1, characterized in that the filter cake is conveyed towards the shaft by means of a conveyor screw.

3. Method according to claim 1 or 2, characterized in that before the pressing or blowing away of the filter cake from out of the shaft, it is sealed by applying a powder-shaped or viscous medium, such as a viscous oil.

4. Method according to claim 3, characterized in that the sealing means is pressed into the shaft by means of a plunger.

5. Method according to one of the preceding claims, characterized in that the opening and closing of the discharge of the shaft takes place automatically, more in

particular by the controlling of one or more sensors, positioned within the shaft.

6. Method according to one of the preceding claims, characterized in that the discharge when as the cake reaches a certain maximum height within the shaft, is opened for a certain period of time.

7. Method according to claim 6, characterized in that the opening time at the opening cyclus is increased or decreased with a fixed time interval in dependance upon the not-reaching, respectively the passing of a certain desired minimum height of the cake within the shaft.

8. Method according to claim 7, characterized in that the opening of the discharge takes place by the controlling of a high level sensor and the increasing or decreasing of the opening time with the time interval takes place by the controlling of a low level sensor.

9. Method according to one of the preceding claims, characterized in that the outlet of the discharge at the high level sensor remaining activated during a certain period of time, is increased at the following opening cyclus.

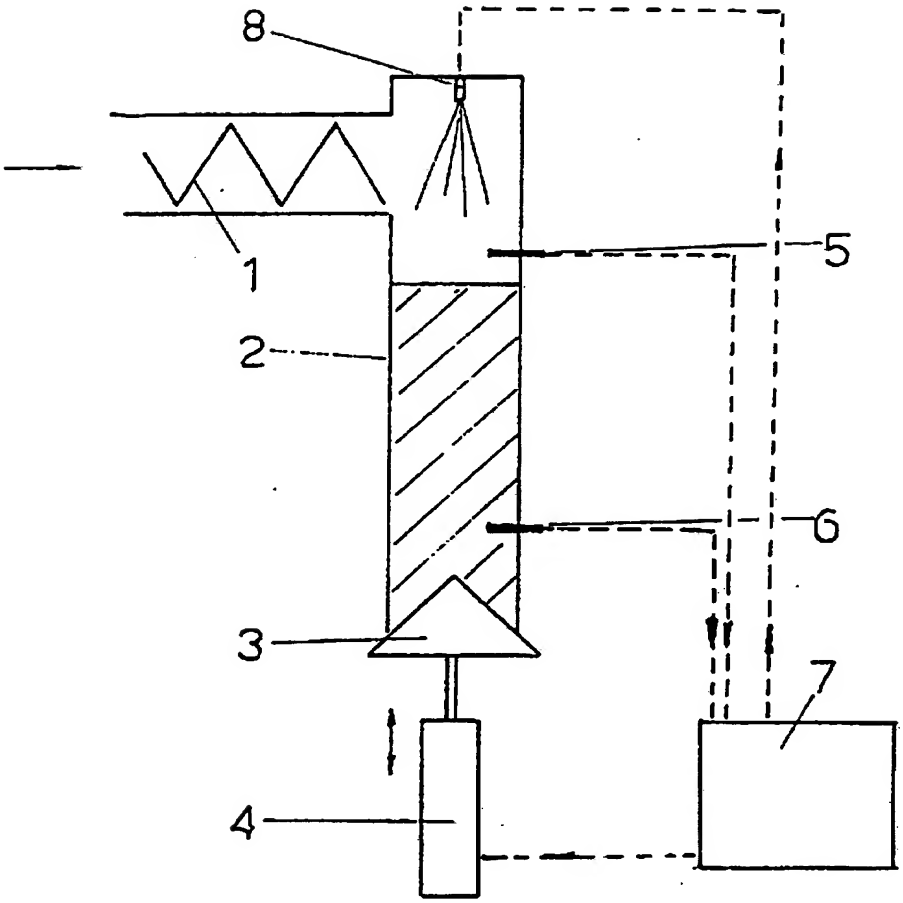
10. Apparatus for the use of the method according to one or more of the preceding claims, comprising a high pressure continuous filter apparatus, with a filter vessel, provided with conveyor means, more in particular a conveyor screw, by means of which the filter cake loosened from the filter elements may be discharged from out of the filter vessel, characterized in that the conveyor means connect onto a discharge shaft, which at or near its bottom end is provided with a closing means, in such a way, that when the filter cake reaches a certain height within the shaft, the shaft is opened near

or at its bottom end and the cake is pressed or blown out of the shaft by the over-pressure within in the filter vessel.

11. Apparatus according to claim 6, characterized in that the shaft widens conically towards its bottom end.

12. Apparatus according to claim 6 or 7, characterized in that the shaft is provided with one or more sensors, such as electrodes, by means of which the height of the cake within the shaft may be determined and the closing means of the shaft may be controlled.

13. Apparatus according to one of the preceding claims, characterized in that the shaft is provided with one or more inlet openings, through which a sealing means such as a viscous oil, for sealing the openings in the cake or between cake elements, is put onto the upper side of the cake before it is pressed or blown away out of the shaft.


8
1
5
2
6
3
7
4

INTERNATIONAL SEARCH REPORT

International Application No PCT/NL 90/00184

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 B01D29/94 ; B01D29/60

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
Int.Cl. 5	B01D

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched[8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category °	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No.[13]
X	NL,A,8005787 (AMAFILTER) 17 May 1982 see pages 1 - 7	1-5, 10-13

° Special categories of cited documents : [10]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
25 FEBRUARY 1991	15. 03. 91
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	miss T. MORTENSEN

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO. NL9000184

SA 43299

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office EDP file on 11/03/91
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
NL-A-8005787	17-05-82	None	

EPO FORM P0479

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82